

What is claimed is:

1 1. A light emitting device comprising:
2 (a) a primary light source which emits primary light; and
3 (b) a phosphor material which absorbs at least a portion of the primary
4 light and emits a secondary light, wherein the secondary light or the combination of the
5 secondary light with the primary light comprises a white light with a color rendering index
6 of at least 90.

1 2. The light emitting device of claim 1, wherein white light has a color
2 rendering index of at least 95.

1 3. The light emitting device of claim 1, wherein the white light has a
2 color rendering index of 100.

1 4. The light emitting device of claim 1, wherein the device produces
2 white light with an efficiency of at least 30 lm/w.

1 5. The light emitting device of claim 1, wherein the primary light is
2 ultraviolet or blue light.

1 6. The light emitting device of claim 1, wherein the primary light
2 comprises wavelengths of from 320 nm to 480 nm and the secondary light has a lower
3 energy than the primary light.

1 7. The light emitting device of claim 6, wherein the primary light
2 source is a light emitting diode.

1 8. The light emitting device of claim 1, wherein the primary light
2 source is an infrared light source and the secondary light has a higher energy than the
3 infrared light.

1 9. The light emitting device of claim 8, wherein the primary light
2 source is a red light emitting diode.

1 10. The light emitting device of claim 1, wherein the phosphor material
2 comprises a plurality of nanoparticles.

1 11. The light emitting device of claim 10, wherein the nanoparticles
2 comprise a Group IV semiconductor.

1 12. The light emitting device of claim 10, wherein the nanoparticles
2 have an average particle diameter of from about 1 to about 150 angstroms.

1 13. The light emitting device of claim 1, wherein the phosphor material
2 has an emission profile comprising red, green and blue emission peaks.

1 14. The light emitting device of claim 11, wherein the Group IV
2 semiconductor is silicon.

1 15. The light emitting device of claim 11, wherein the Group IV
2 semiconductor is germanium.

1 16. A light emitting device comprising:

2 (a) a primary light source which emits primary light; and
3 (b) a phosphor material comprising a plurality of nanoparticles which
4 absorb at least a portion of the primary light and emit a secondary light, wherein the
5 secondary light or the combination of the secondary light with the primary light comprises
6 a white light and further wherein the white light is produced with an efficiency of at least
7 30 lm/w.

1 17. The light emitting device of claim 16, wherein the nanoparticles
2 comprise a Group IV semiconductor.

1 18. The light emitting device of claim 17, wherein the nanoparticles
2 have an average particle diameter of from about 1 to about 150 angstroms.

1 19. The light emitting device of claim 16, wherein the phosphor material
2 has an emission profile comprising red, green and blue emission peaks.

1 20. The light emitting device of claim 17, wherein the Group IV
2 semiconductor is silicon.

1 21. The light emitting device of claim 17, wherein the Group IV
2 semiconductor is germanium.

1 22. A light emitting device comprising:
2 (a) a primary light source which emits primary light; and
3 (b) a phosphor material comprising a plurality of nanoparticles, the
4 nanoparticles comprising a Group IV semiconductor, which absorbs at least a portion of
5 the primary light and emits a secondary light, wherein the secondary light or the
6 combination of the secondary light with the primary light comprises a white light.

1 23. The light emitting device of claim 22, wherein the primary light is
2 ultraviolet or blue light.

1 24. The light emitting device of claim 22, wherein the primary light
2 comprises wavelengths of from 320 nm to 480 nm and the secondary light has a lower
3 energy than the primary light.

1 25. The light emitting device of claim 24, wherein the primary light
2 source is a blue light emitting diode or an ultraviolet light emitting diode.

1 26. The light emitting device of claim 23, wherein the primary light
2 source is a fluorescent lamp.

1 27. The light emitting device of claim 22, wherein the primary light
2 source is an infrared light source and the secondary light has a higher energy than the
3 infrared light.

1 28. The light emitting device of claim 27, wherein the primary light
2 source is a red light emitting diode.

1 29. The light emitting device of claim 27, wherein the primary light is a
2 halogen lamp or an incandescent lamp.

1 30. The light emitting device of claim 22, wherein the nanoparticles
2 have an average particle diameter of from about 1 to about 150 angstroms.

1 31. The light emitting device of claim 22, wherein the phosphor material
2 has an emission profile comprising emission peaks in the green to red regions of the visible
3 spectrum.

1 32. The light emitting device of claim 22, wherein the phosphor material
2 has an emission profile comprising emission peaks in the blue to red regions of the visible
3 spectrum.

1 33. The light emitting device of claim 22, wherein the Group IV
2 semiconductor is silicon.

1 34. The light emitting device of claim 22, wherein the Group IV
2 semiconductor is germanium.

1 35. The light emitting device of claim 22, wherein the nanoparticles
2 comprises core/shell nanoparticles comprising a Group IV semiconductor core and an
3 inorganic shell.

1 36. The light emitting device of claim 35, wherein the inorganic shell
2 comprises ZnS or CdS.

1 37. The light emitting device of claim 35, wherein the core comprises
2 silicon and the shell comprises Si_3N_4 or SiC.

1 38. The light emitting device of claim 35, wherein the core comprises
2 silicon and the shell comprises Ge.

1 39. The light emitting device of claim 35, wherein the core comprises
2 germanium and the shell comprises Si.

1 40. The light emitting device of claim 22, wherein the nanoparticles are
2 dispersed in a binder.

1 41. The light emitting device of claim 22, wherein the primary light
2 source comprises an electroluminescent device.

1 42. The light emitting device of claim 22, wherein the primary light
2 source comprises an organic light emitting material.

1 43. The light emitting device of claim 42, wherein the nanoparticles are
2 dispersed in the organic light emitting material.

1 44. A phosphor material comprising a plurality of luminescent group IV
2 semiconductor nanoparticles having a polydisperse size distribution dispersed in a binder.

1 45. The phosphor material of claim 44, further comprising a plurality of
2 electroluminescent particles dispersed in the binder.

1 46. The phosphor material of claim 44, wherein the binder is an
2 electroluminescent polymer.

1 47. A phosphor material comprising a plurality of domains disposed on
2 an organic film, each domain comprising a plurality of luminescent semiconductor
3 nanoparticles having a substantially monodisperse size distribution.

1 48. The phosphor material of claim 47, wherein the organic film has a
2 plurality of luminescent nanoparticles dispersed therein.

1 49. The phosphor material of claim 47, wherein the luminescent
2 nanoparticles dispersed in the organic film have a substantially monodisperse size
3 distribution.